High-Efficiency, on-Line Membrane Air Dehumidifier Enabling Sensible Cooling for Warm and Humid Climates

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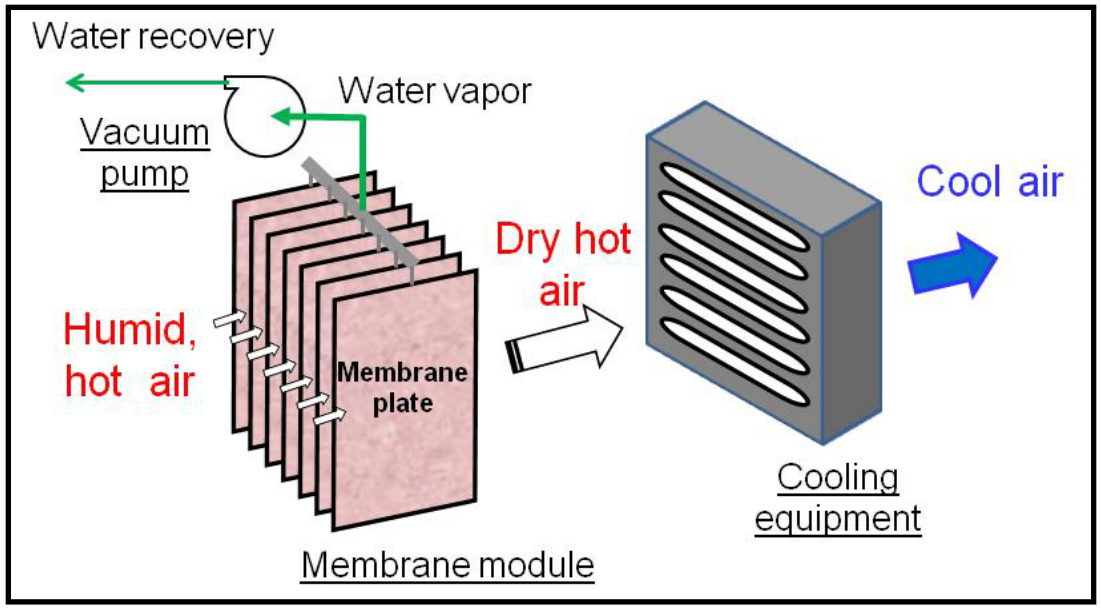
ADMA ADVANCE MATERIALS

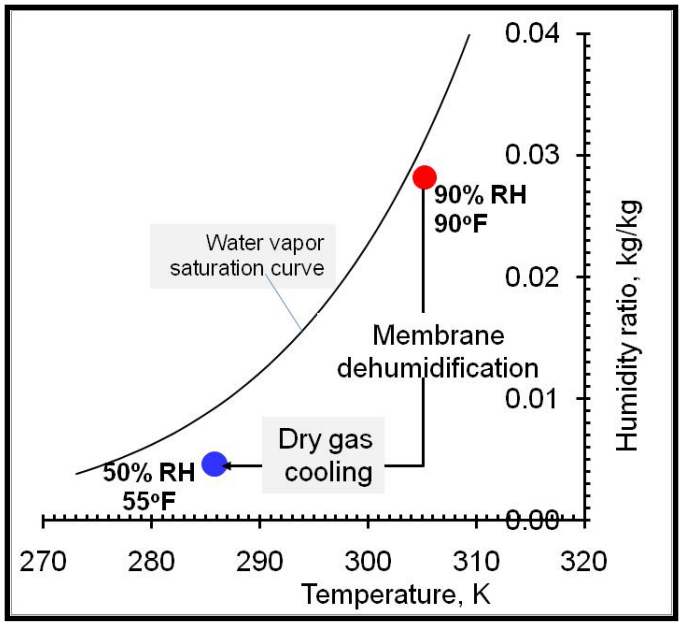
Pacific Northwest NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

ENERGY SYSTEMS LABORATORY
Texas Engineering Experiment Station
Texas A&M University System

Dehumidification at Temperature and Pressure of Incoming Air

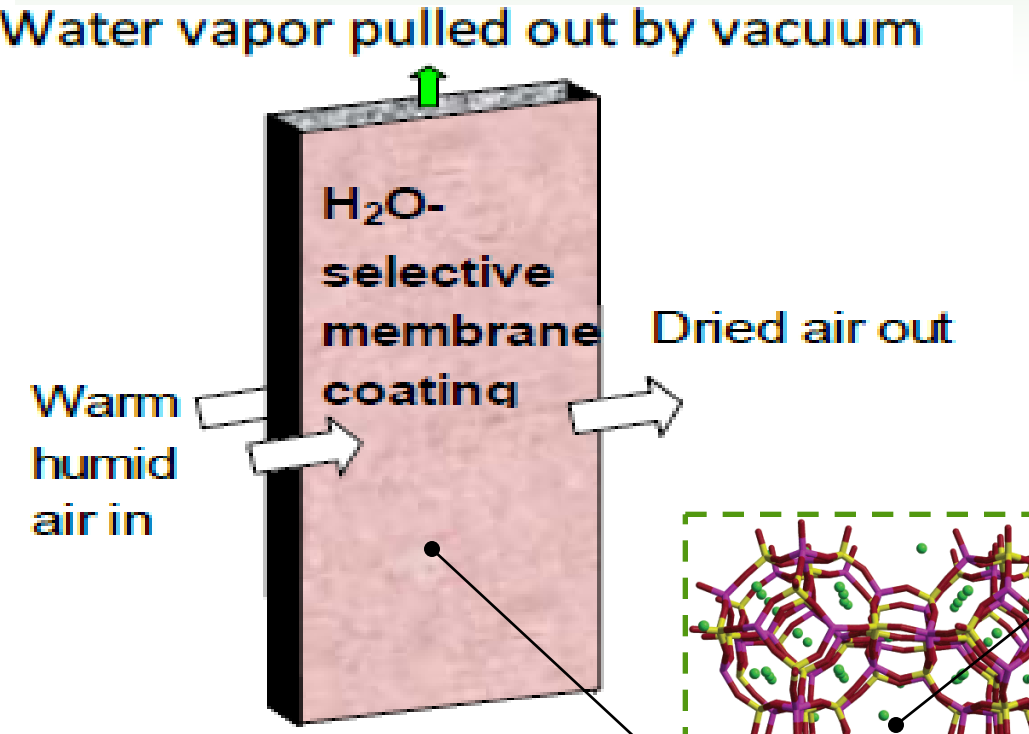
Reduce HVAC energy consumption by removing moisture without water condensation: >50% more energy-efficient than conventional air conditioning



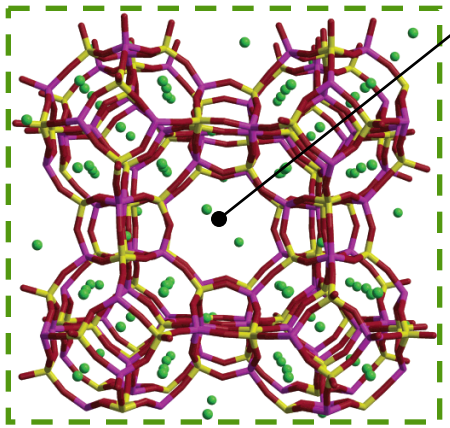


- Continuous removal of water vapor through a selective membrane
- No regeneration, no environmental emissions
- A totally green process

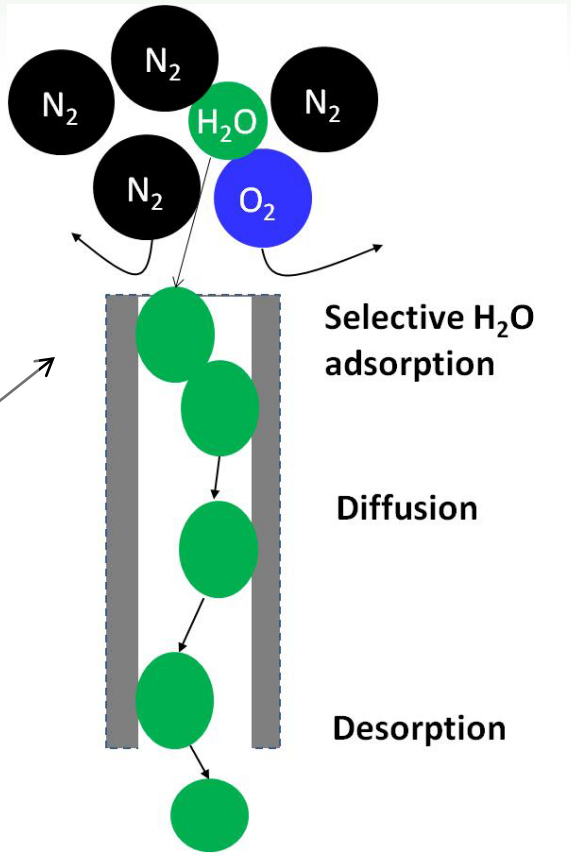
Illustration of Key Technical Concepts



Selective H_2O permeation

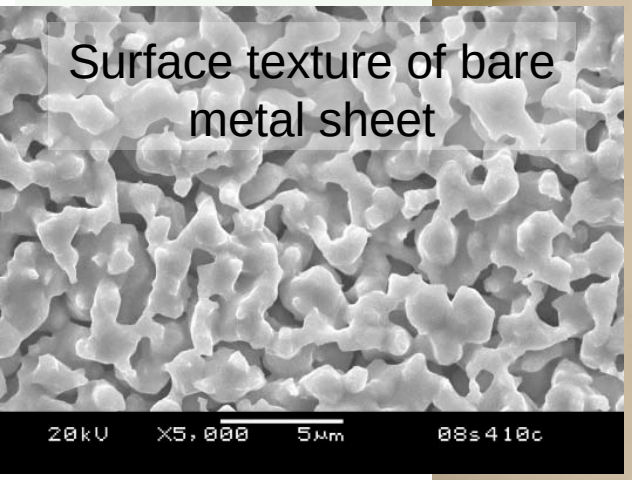


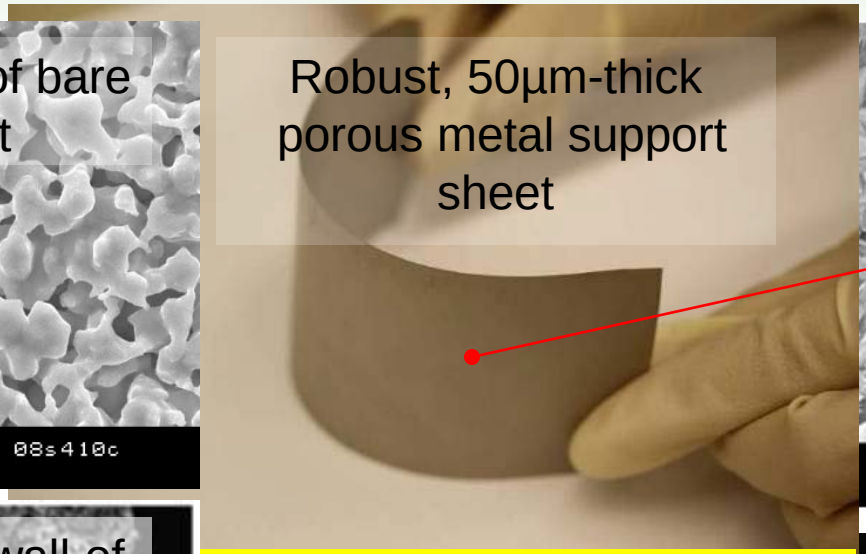
Crystal lattice structure of H_2O-thirsty zeolite material

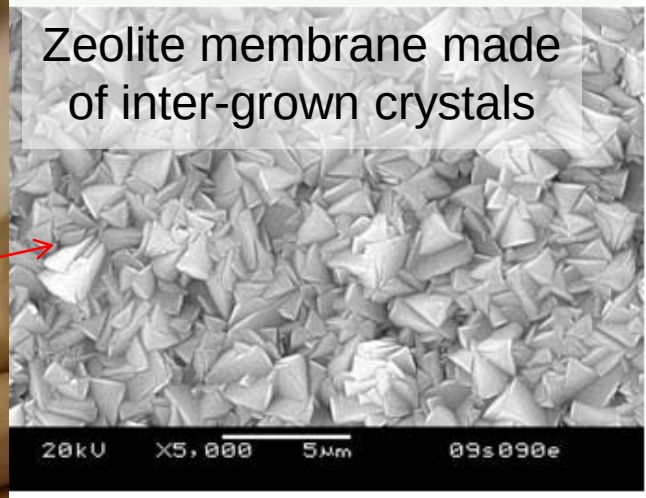


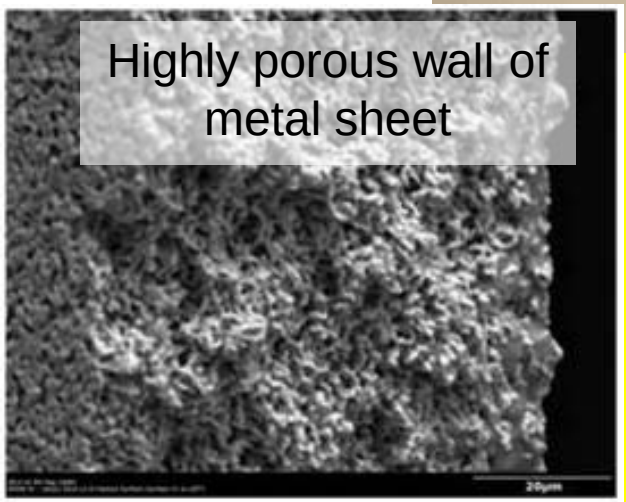
Pore size must be small enough to block air permeation by adsorbed H_2O

Key Technology Innovations – Thin Zeolite/Porous Metal Membrane Sheet



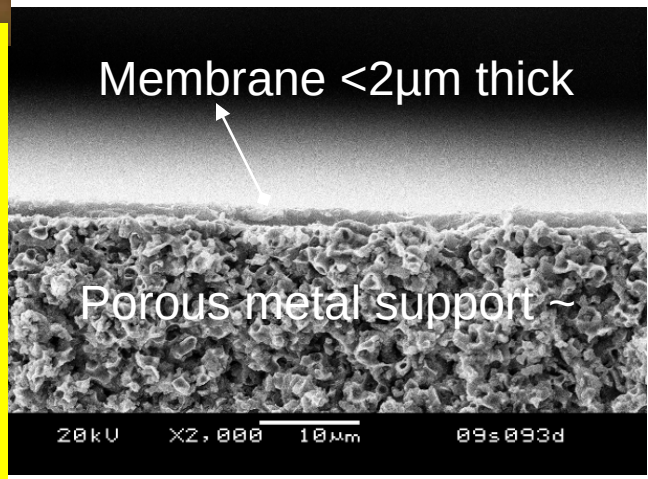






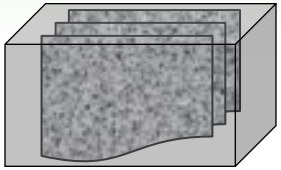
Key performance attributes:

- Two to three orders of magnitude higher water permeation flux than published results
- Potential of very high H_2O/air selectivity (>50)



Final Deliverable

Replaced by



ADMA Membrane module:

- 30liter, 5 kg (one-ton loading)
- **Compact membrane module readily fits into duct for in-line air dehumidification**
- **Key, high-value component product**

Conventional dual-column air drier:

- 300 liter, 150 kg/each (one-ton loading)